

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: HASHIMOTO et al.

Title: TENSIONER

Serial No.: 10/679,644

Filed: October 6, 2003

Assignee: Tsubakimoto Chain Co.

Art Unit: 3682

Primary Examiner: JOHNSON, Vicky A.

Docket: 8192

Date: November 22, 2007

DECLARATION

I, Hiroshi HASHIMOTO , am one of the inventors of the above-identified patent application, and being advised, do hereby declare and state that:

1. I am an inventor of Patent Application Serial No. 10/679,644 in the United States Patent and Trademark Office.
2. I am employed at Tsubakimoto Chain Co. I am fluent in English and/or I have had the instant declaration translated into Japanese before making and executing the declaration.
3. I am experienced in the art of tensioners, their manufacture, design, and usage and I have been working in the art of tensioners for the past 15 years.

4. I have read and understand the final office action dated July 31, 2007 in regard to the above identified patent application. I am fluent in English and/or I have had the final office action dated translated into Japanese before making and executing the declaration.

4. As used in the Simpson reference (U.S. Patent No. 5,967,921), injection molding is a process whereby plastic is injected into a cavity. Insert molding is a type of injection molding process whereby plastic is injected into a cavity around an insert piece placed into the molding cavity immediately prior to molding. Injection molding machines hold the molds in which the plastic is shaped. The cost of manufacturing molds depends on a large number of factors including complexity of the pieces, expected tool longevity, surface finishes, and others. Production rate is affected by the length of cycle time to produce each part. Insert molding requires greater cycle time than existing parts contributing to higher costs.

In Simpson, a tensioner 100 includes a housing 102 having a bore 104. The bore 104 has an inner surface 106. A sleeve 105 is received within the bore of the housing body 102. The housing body 102 may be made of a plastic material such as polyphenylene sulfide with glass and mineral fillers. The sleeve 105 has an outer surface 108 having a plurality of projections or recesses 110. The sleeve 105 may be fixed within the bore 104 by using friction, threads, mechanical interlocking, or insert molding.

5. During the insert molding process of Simpson, the sleeve 105 is

positioned in the housing 102 by first placing the sleeve 105 in a mold 700. Melted plastic is injected into the mold and surrounds the sleeve 105 within the mold and cools to form the housing body 102. The joining of the sleeve 105 and housing 102 may require an additional support element 114. The additional support element 114 may be a ring with a portion of the ring positioned within a groove 116 in the sleeve 105.

6. Referring to the Simpson (US Patent No. 5,967,921) structure, the plastic material is injected around the sleeve 105 to form a housing body 102 and complete tensioner 100. The outer surface of sleeve 105 has recesses therein which must be completely filled. However, it is likely that these recesses will not be completely filled thus creating a leak. In col. 3, line 51, Simpson states that Aa leak-resistant@ structure is formed. A seal is not formed in Simpson.

7. Injection molding and insert molding are subject to a number of critical defects such as delamination, jetting, embedded contaminates, burrs, warping, knit lines, voids, and gaps that can lead to problems in the housing body 102 and overall failure in the tensioner 100. These defects are especially problematic and affect the connection between the inner and the outer body of the tensioner of Simpson.

8. Further, in the insert molding of Simpson, the fitting force between an outer body (plastic resin) and an inner body (sleeve) is weak. The different coefficients of thermal expansion of the metal inner body and the plastic tend to

generate gaps therebetween at high temperature. As a result, the outer body of the tensioner is not sealed to the inner body.

9. Welding is a process in which two or more materials are joined together by application of heat, pressure, or a combination of both. Heat welding is an accurate localized method of welding and sealing plastics. Another localized method of welding and sealing thermoplastics is ultrasonic welding where heat is generated by vibration from ultrasonic energies. Localized heat is generated by the friction of vibration at the surfaces to be joined. Ultrasonic welding is also known as ultrasonic sealing. Welding in the present invention results in a uniform seal between the inner and the outer body of the device so that no leaks can occur.

10. The sealed structure in the present invention resulting from heat welding is different from the structure produced by injection molding and insert molding in the cited reference. A sealed connection between the housing (outer body) and sleeve (inner body) is made in the instant invention which does not require the use of additional supporting members or special assembly equipment. In the present invention, the inner body (sleeve) is cylindrical and is sealed to the outer body. As a result, durability and ease of manufacturing is increased.

11. In the present invention, the inner body 24, the plunger 26, the compression spring 27, the check valve 31, and the movement-backward preventing mechanism 32 are incorporated to complete the inner body side unit 33. Then, the inner body side unit 33 is press-fitted into the outer body 23, and a

press-fitted portion of the inner body fitting hole 23a in the outer body 23 is fused and softened by an ultrasonic welding machine. By both fusing and softening the press-fitting portion of the inner body fitting hole 23a and the outer body 23, no gap between the inner body forming the inner body side unit 33 and the inner body fitting body hole 23a of the outer body 23 exists and the inner and outer bodies are completely sealed. Leakage from the gap is prevented and additional supporting members such as O rings are not necessary as a result of this direct sealing engagement.

12. In the invention as claimed in the instant application, ultrasonic welding creates an integrated bond between plastic and metal forming a seal between the inner body and outer body.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on November 20, 2007 at Osaka, Japan.

Hiroshi Hashimoto
Printed Inventor Name: